surely simpler to write *Turdus propinquus* than *Turdus migratorius propinquus*. After all, nomenclature was not science, and even if we had the most perfect system of nomenclature which could be devised, he did not see how science would be thereby advanced. It is true we could not get on without nomenclature, but the simpler it was the better; aud the less time we spent in discussing it the more we should have to devote to real study.

Dr. Coues, replying to previous speakers, said that the system of trinomial nomenclature had nothing whatever to do with individual variations of specimens from one locality. It was not a question of naming varieties or hybrids, but there was a definite principle to proceed upon, namely, that of geographical and climatal variation. He was well aware that the use of three names to designate objects in zoology was no new thing; but he believed that the restricted application of trinomialism to the particular class of cases he had discussed was virtually novel, and that his system would prove to be one of great practical utility. He thought that the application of the principle was a question which, after this discussion, and after further private discussions, might well be left to the discretion of authors.

The Chairman concluded the meeting by saying:—I hope that Dr. Elliott Coues is satisfied with the manner with which his views have been received. Although there are some uncompromising binomialists present, many have pronounced themselves as what may be termed limited trinomialists, and some appear to go as far as Dr. Coues himself. Distinctly defined species undoubtedly exist in great numbers, owing to extinction of intermediate forms; for these the binomial system offers all that is needed in defining them. But on the other hand there are numbers of cases in the actual state of the earth, and far more are being constantly revealed by the discoveries of palæontology, and nowhere so rapidly as in Dr. Coues' own country, where the infinite gradations defy the discrimination either of a binomial or a trinomial system. Zoologists engaged in the question of nomenclature are being gradually brought face to face with an enormous difficulty in consequence of the discovery of these intermediate forms, and some far more radical change than that now proposed will have to be considered. In conclusion I must express the thanks of the meeting to Dr. Coues for having brought his views and those of his countrymen, of whom he is such a worthy representative, before us, and also to Mr. Bowdler Sharpe, to whose zeal and energy the organisation of the meeting is entirely due.

A unanimous vote of thanks was given to Prof. Flower for presiding.

KRAKATOA

AT the meeting of the Meteorological Society of Mauritius on May 22 some interesting communications were made relating to the Krakatoa eruption. Among others was a letter from M. Lecomte regarding detonations heard at Diego Garcia on August 27. In his letter, which was written at Diego Garcia on April 24, M. Lecomte says:—"Le lundi 27 août entre 10 et 11 heures du matin, pendant le déjeûner, nous avons entendu des détonations sourdes mais violentes. Nous avons cru tellement à l'appel d'un navire en détresse que nous avons couru et que j ai envoyé plusieurs hommes vers le rivage extérieur de l'île sur plusieurs points différents, en observation. Le Capitaine Florentin de l'*Eva Joshua* et son second, M. Daniel Sauvage, venaient de quitter Pointe de l'Est pour aller mouiller à Pointe Marianne, lorsqu'ils ont entendu les mêmes détonations. Ils ont aussitôt envoyé des hommes en observation à l'extrémité des mâts. Mais comme les miens ils n'ont rien vu.

"Ce jour là et les jours suivants le soleil était comme obscurci, probablement par la formidable quantité de vapeurs et de cendres qui ont du s'élever dans l'atmosphère."

The information obligingly furnished by M. Lecomte was valuable, inasmuch as, take n in conjunction with the reports which had been received from Rodrigues, it confirmed verbal information which had been previously obtained. There could now be no doubt that the explosions which took place at Krakatoa were distinctly heard both at Diego Garcia and Rodrigues, and there was probably no other recorded instance of sound having travelled over so great a distance. The fact, also, that at Diego Garcia the sun was partially obscured on August 27 and on several subsequent days, as well as at the Seychelles and Rodrigues, was an additional proof of the great quantity of matter which must have been ejected from Krakatoa, and of the rapidity with which it was conveyed from its source. There could be no reasonable doubt that the presence of that matter in the atmosphere was the cause of at least the lurid sunsets and sunrises which were observed over the Indian Ocean on the last days of August and in the first week of September.

The Secretary, Dr. Meldrum, stated that the Royal Society of London had appointed a Committee to collect information regarding the phenomena which had been observed during and after the volcanic eruptions that took place at Krakatoa in August, and requests had been received from that and other quarters for information from Mauritius. To these requests the Secretary had replied that he was preparing for his Excellency the Governor a detailed account of what had been observed at Mauritius and several of its dependencies, but that owing to the almost daily reception of additional details his report was not yet ready. All he did, therefore, was to give the general results as far as they had been determined.

Several remarkable phenomena had to be described. In the first place, there were disturbances of the sea water, or, as they had been called by some, tidal disturbances, and these had been observed all over the Indian Ocean.

There were also barometric disturbances, to which attention had first of all been called in Mauritius early in September, and which at the time were ascribed to the explosions at Krakatoa. Some time afterwards it was ascertained in England that these disturbances had extended over the whole globe and that they were recorded by all self-registering barometers in both hemispheres. At Mauritius there were at least seven well-marked disturbances of which the epochs of *maximum intensity* were as follows:—

		h. m.		
(1)	August 27,	0.6	p.m.	local time.
(2)	,, 28,	2.20	p.m.	,,
(3)	,, 28,	10.40	p.m.	,,
(4)	,, 30,	1.35	a.m.	,,
(5)	,, 30,	9.17	a.m.	,,
(6)	,, 31,	1.48	p.m.	,,
(7)	,, 31,	8.00	p.m.	,,

At first these disturbances were supposed in Mauritius to have been due to successive eruptions, but General Strachey, who examined a number of barographs received from different parts of the world, had recently adduced evidence to show that they were produced by an air-wave proceeding outwards from Krakatoa in all directions round the earth, expanding till it was half round, then contracting till it reached the antipodes of its origin, and afterwards returning, the wave thus travelling round the globe two or three times. Assuming that view, the first disturbance at Mauritius (which was at its maximum at oh. 6m. p.m. on the 27th) would be caused by the passage over the Observatory of the wave travelling from east to west; and the third, fifth, and seventh disturbances would be returns of the wave to Mauritius after having gone round the earth. Similarly the second disturbance would be the first passage of the wave travelling from Krakatoa eastward, and the fourth and sixth would be its returns to Mauritius. Now, the mean interval in time between the returns of the wave to Mauritius, in its passage from east to west, was 24h. 38m., and in its passage from west to east 35h. 44m. It would thus appear that the rate of progression had been greater from east to west than from west to east, which may have been partly or wholly due to the great circle passing through Krakatoa and Mauritius being within the tropics, where the prevailing wind was from the eastward. The rate of progression from east to west was very nearly 709 miles an hour, and from west to east 697 miles. By taking as nearly as possible the times half way between the commencements and endings of the disturbances similar results were obtained. There was also an *eighth* (but small) disturbance between 7 and 9 a.m. on September 2, which may have been the fourth return of the wave from east to west, the interval in time between that disturbance and the seventh having been nearly thirty-six hours. The sixth disturbance was the last indication of the wave in its passage from west to east.

Another effect of the Krakatoa eruptions was the spread of ashes and pumice over considerable portions of the Indian Ocean, and a good deal of information on that point also had been collected in Mauritius. The first intimation of the probability of volcanic action in the direction of the Straits of Sunda was contained in a letter published by Capt. Walker, of the *Actæa* in the *Mercantile Record* of June 16, 1883. At noon on

May 20 the *Actæa* was in 6° 50′ S. and 104° 2′ E., and on the morning of that day a "peculiar light green colour" was observed in the sky to the east-south-east, while "from east to east-north-east there was a dark blue cloud, which reached from the horizon to the zenith." "About 2 p.m. it was quite dark. What appeared to be a rain squall rose up from the east, but, instead of rain, a kind of very fine dust commenced to fall, and very soon everything was covered; ships, sails, rigging and men were all dust colour; nothing could be seen 100 yards off. The fall continued steadily all night, and stopped about 9 a.m. on Monday the 21st. When we saw the sun it looked like dull silver. At noon we were in lat. 8° 15′ S. and long. 102° 28′ E., distant from Java Heads about 170 miles. The sky all round remained a dusty hue, and small quantities of dust again fell during the night. The sky did not assume a natural appearance till the 23rd." At a meeting of this Society held on July 12, the Secretary called attention to Capt. Walker's letter, and said there was little doubt that the dust in question had come from Krakatoa, as, according to a note in NATURE of June 7, a volcano in that island was in full eruption. From that time accounts of pumice and ashes observed in the Indian Ocean had been extracted from log-books, and they showed that on several occasions vessels had passed through fields of pumice long before the great eruptions of August 26 and 27. After that month the reports became more frequent, and they still continued, the latest being from the vicinity and shores of Mauritius, where, since the middle of February, large quantities of pumice had been seen. It would appear, however, that fields of pumice had passed Mauritius long before February, for "a large quantity of pumice-stone and lava was washed up on the beach at Durban (Natal) on October 23." According to the reports received, fields or lanes of pumice had been observed in different parts of the Ocean from 105° to 48° E. and 6° to 12° S. Farther south the extent in longitude had been apparently less.

That the remarkable sunrises and sunsets which had been observed over a great part of the world after August 27 were due to matter ejected from Krakatoa seemed to be generally admitted. The few who objected to the volcanic dust theory had not proposed any other theory that so completely accounted for the facts. The presence of vapours and finely-divided dust at certain elevations would, as a consequence of known physical laws, produce all the chromatic effects that had been seen and described, and it was known that immense quantities of matter had been shot up from Krakatoa. Similar phenomena had been witnessed by observers between whom and the sun volcanic dust passed, as on the occasion of an eruption of Cotopaxi a few years ago. But it was not necessary to go so far back. From May 20 to 22 last, after an eruption of Krakatoa, Captain Walker, as already stated, observed that to the east-south-east the sky was of a light green colour, that on the 21st the sun looked like dull silver, that the sky all round was of a dusty hue, and that it did not assume its natural appearance till the 23rd. That was perhaps the earliest instance of the chromatic effects of the Krakatoa dust and vapours. Immediately after the eruptions of August 27 they were more intense and on a greater scale. At the Seychelles on the 27th the sky, according to Mr. Estridge, was hazy all day. The sunset on that day was gorgeous; the sky was lurid all over, and beams of red light stretched from over St. Anne's to nearly the horizon. At sunset on the 28th the sun looked as it did through a fog on a frosty day in England. On the morning of the 29th the sun at 7 a.m. was more like a full moon than anything else. According to other letters from the Seychelles the sun for a whole week appeared dim. At Rodrigues, according to Mr. Wallis, whose report was written on August 31, the sky at north-west on every evening since the 27th had a very threatening and strange appearance of a deep purplish red colour, which lasted till 7.15 p.m., and which, with the disturbances of the sea water, caused much fear and excitement. Similar phenomena were observed on the same evenings at Diego Garcia and St. Brandon, and for several days the sun looked as if partially obscured. At Mauritius the sky was overcast throughout the whole of the 27th, and it was observed and noted at the time that there was an unusual dimness. On the evening of the 28th there was a gorgeous sunset, the first of a long series of remarkable colorations and glows, which had already been described. Observations of these optical phenomena had been taken daily during nearly the last nine months whenever the weather permitted. Knowing what had been observed on board of the *Actæa*, and that Krakatoa had been in eruption, these extraordinary sunsets and sunrises were attributed to the presence in the upper strata of the air of finely-divided matter, and probably gases and vapours, from Krakatoa, and subsequent events confirmed that opinion. It was difficult to explain phenomena which had been identical under all conditions of weather, and in many distant places, by any purely meteorological causes. To the meteoric dust theory it might be objected that it was purely an hypothesis almost, if not wholly, unsupported by facts. No unusual number of meteors had been seen. No extraordinary glows had been observed at or near the times of the great meteoric showers of November 1866, and November 1872. Moreover one would suppose that if the earth had for months been passing through volumes of meteoric dust the chromatic effects would have appeared simultaneously wherever the sun rose and set. But such had not been the case. Upon the whole there seemed to be a preponderance of evidence in favour of the volcanic dust theory. The objection that the quantity of matter was insufficient was not a formidable one, for the effects did not depend merely upon the quantity of matter that had reached the higher regions, but also upon its form and degree of tenuity. A few pounds of matter might be spread over thousands of square miles. As to the objection that it was difficult to conceive how even finely-divided matter could remain so long in suspension, it might be remarked that, independently of the possibility of the particles being electrified, the lower strata of the atmosphere might be denser than the foreign matter in the upper strata. The extraordinary sunsets and sunrises which were observed in 1783-84, and which Arago and others ascribed to volcanic dust, were said to have lasted eleven months. Those of 1883-84 would probably last fully as long. Within the last few weeks there had been at Mauritius a considerable increase in the intensity and duration of the glows.

EVIDENCES OF THE EXISTENCE OF LIGHT AT GREAT DEPTHS IN THE SEA [1]

THE evidences of the presence of light and its quality and source at great depths are of much interest. At present very little experimental knowledge in regard to these questions is available. That light of some kind, and in considerable amount, actually exists at depths below 2000 fathoms, may be regarded as certain. This is shown by the presence of well-developed eyes in most of the fishes, all of the cephalopods, most of the decapod Crustacea, and in some species of other groups. In many of these animals, living in 2000 to 3000 fathoms, and even deeper than that, the eyes are relatively larger than in the allied shallow-water species; in others the eyes differ little, if any, in size and appearance, from the eyes of corresponding shallow-water forms; in certain other cases, especially among the lower tribes, the eyes are either rudimentary or wanting in groups of which the shallow-water representatives have eyes of some sort. This last condition is notable among the deep-water gastropods, which are mostly blind; but many of these are probably burrowing species; and it may be that the prevalent extreme softness of the ooze of the bottom, and the general burrowing habits, are connected directly with the habits or rudimentary condition of the eyes in many species belonging to different classes, including Crustacea and fishes. Such blind species usually have highly developed tactile organs to compensate for lack of vision.

Other important facts bearing directly, not only on the *existence*, but on the *quality*, of the light, are those connected with the coloration of the deep-sea species. In general, it may be said that a large proportion of the deep-sea animals are highly *coloured*, and that their colours are certainly *protective*. Certain species, belonging to different groups, have pale colours, or are translucent, while many agree in colour with the mud and ooze of the bottom; but some, especially among the fishes, are very dark, or even almost black; most of these are probably instances of adaptations for protection from enemies, or concealment from prey. But more striking instances are to be found among the numerous brightly-coloured species belonging to the echinoderms, decapod Crustacea, cephalopods, annelids, and Anthozoa. In all these groups, species occur which are as highly coloured as their shallow-water allies, or even more so. But it is remarkable that in the deep-sea animals the bright colours are almost always shades of orange and orange-red, occasionally brownish red,

[1] From a paper in *Science*, July 4, on "Results of Dredgings in the Gulf Stream Region by the U. S. Fish Commission."